FIG. 1

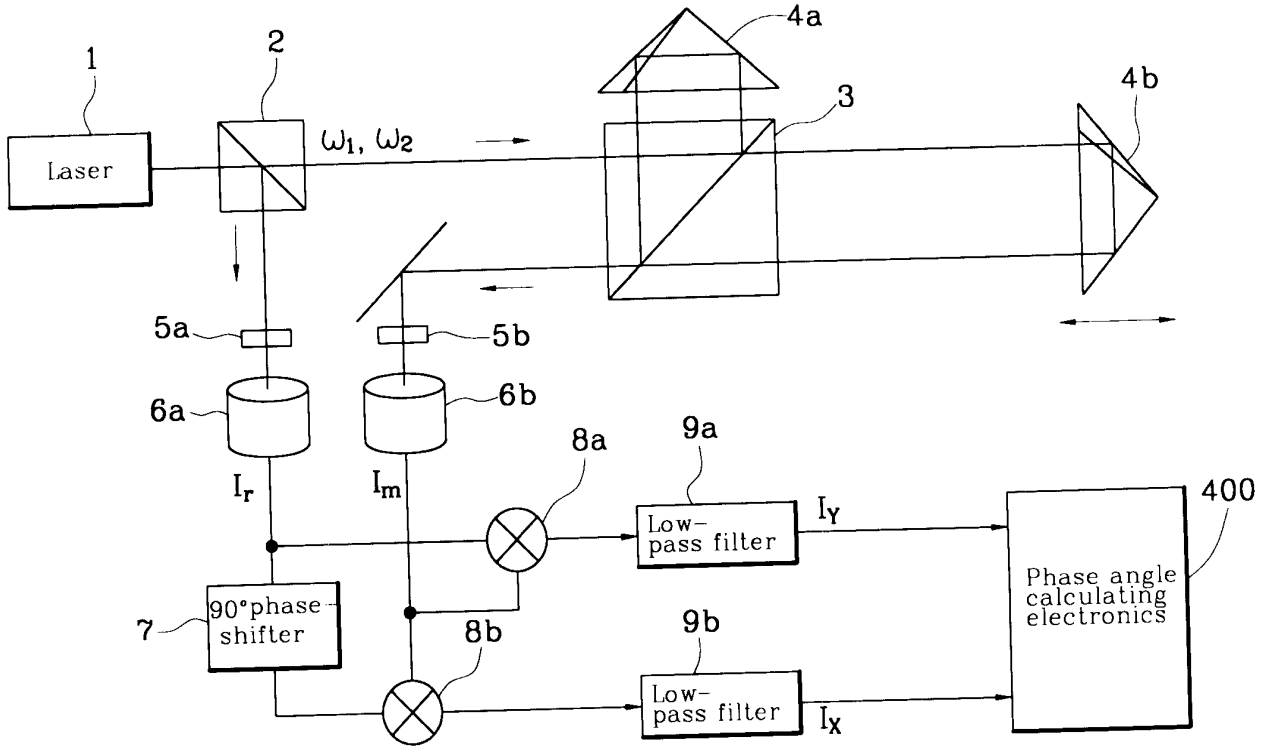

1
2
4a
4b
3
Laser
ω_1, ω_2
5a
5b
6a
6b
I_r
I_m
8a
9a
Low-pass filter
I_Y
400
Phase angle calculating electronics
7
90°phase shifter
8b
9b
Low-pass filter
I_X

FIG. 2

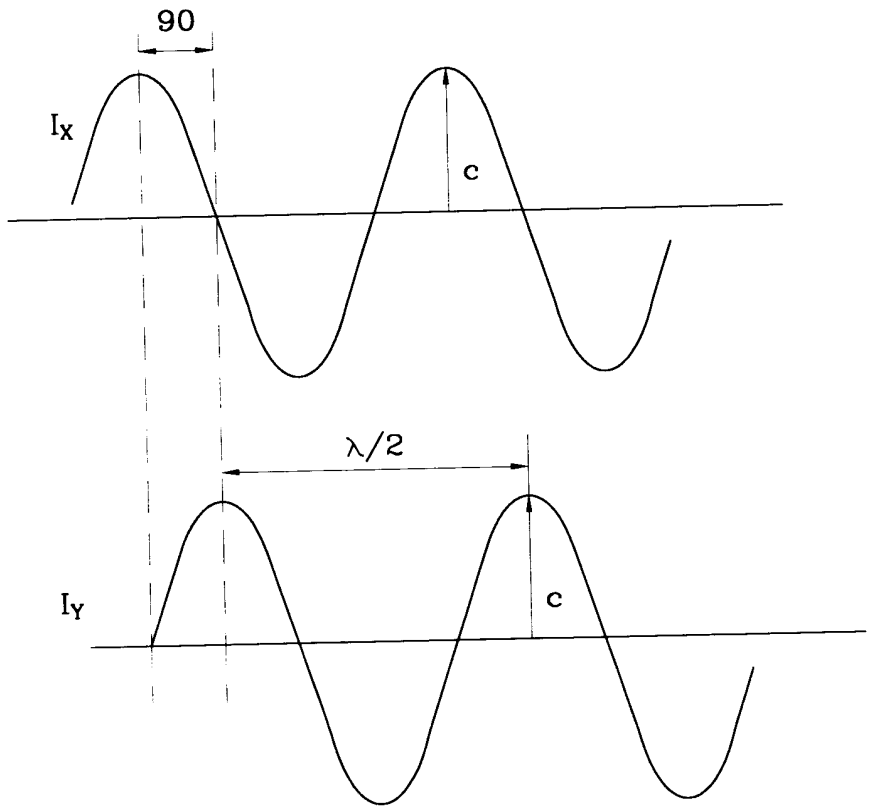


FIG. 3

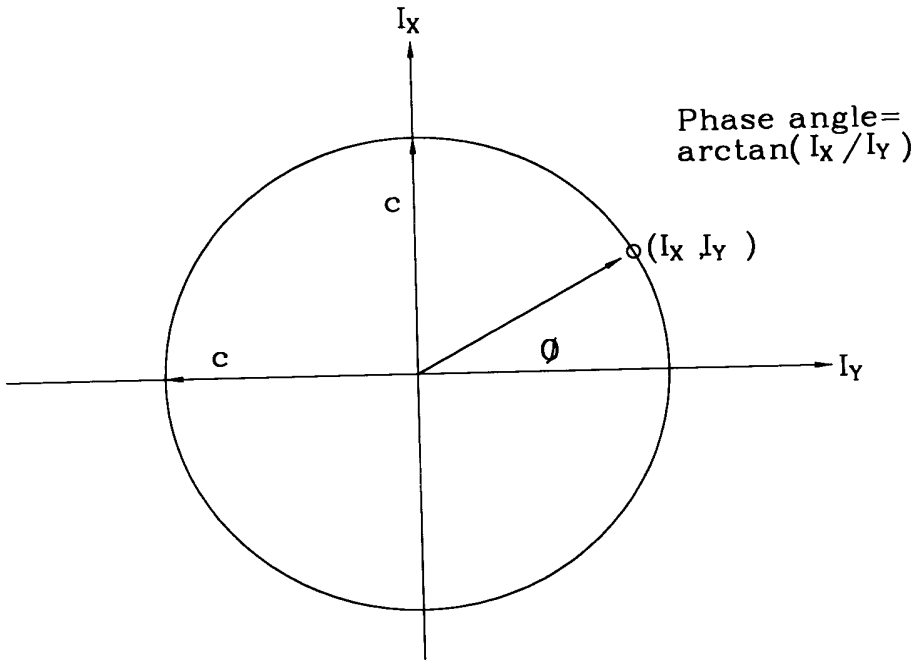
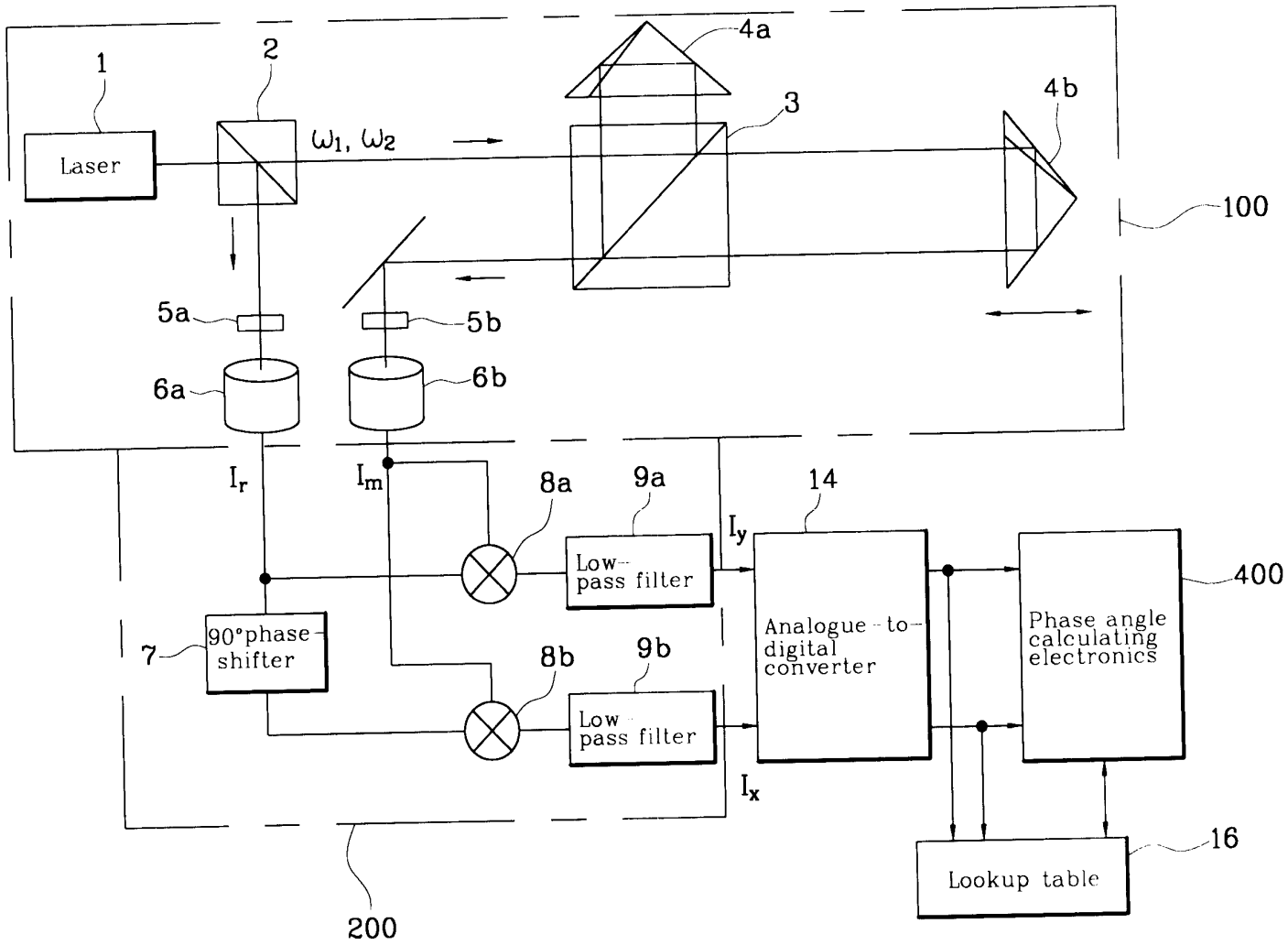


FIG. 4


1
2
4a
4b
3
Laser
ω_1, ω_2
100
5a
5b
6a
6b
I_r
I_m
8a
9a
14
I_y
Low-pass filter
400
7
90°phase shifter
8b
9b
Analogue-to-digital converter
Phase angle calculating electronics
Low-pass filter
I_x
16
Lookup table
200

5/9

FIG. 5

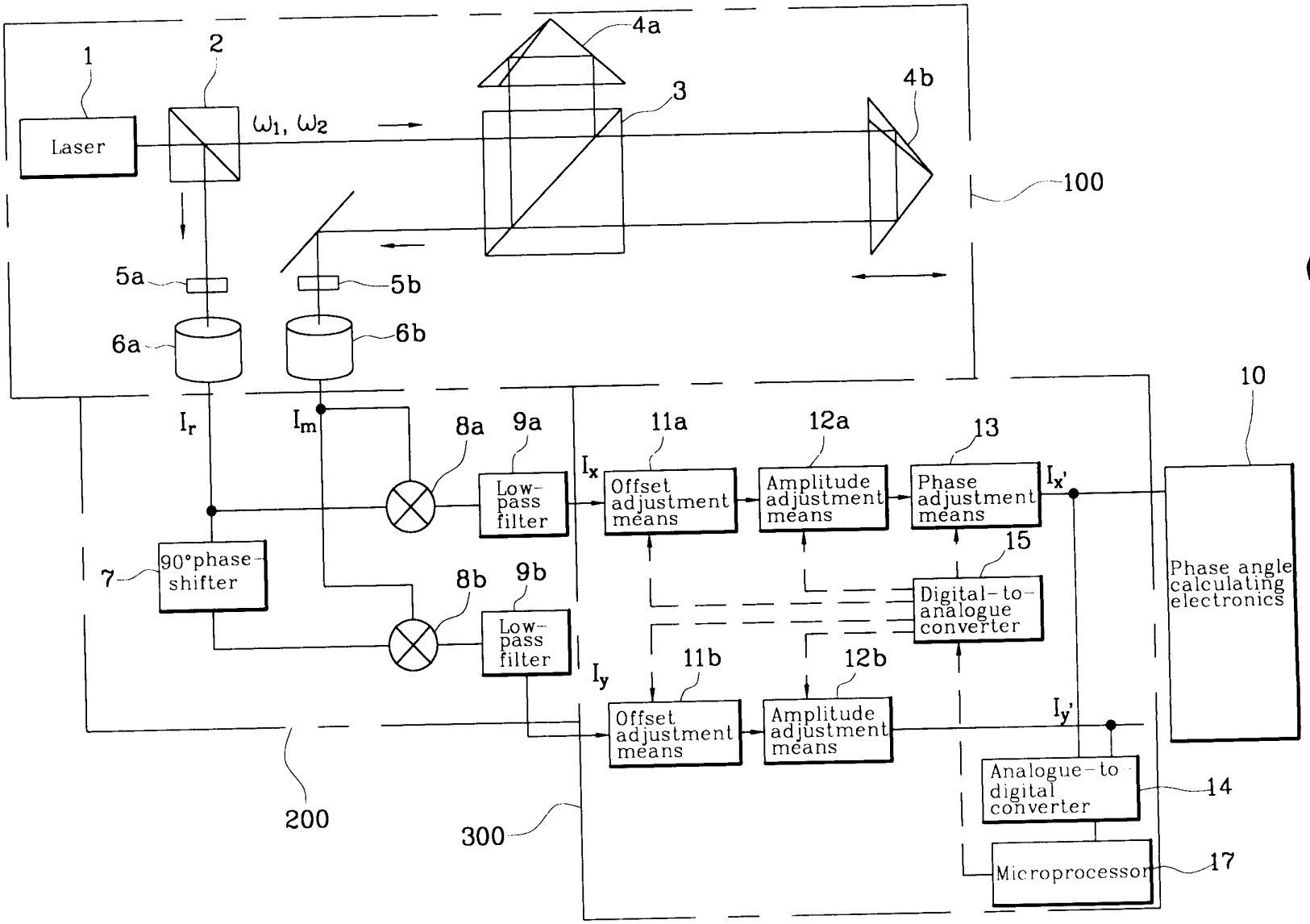

1
2
4a
3
4b
Laser
ω_1, ω_2
100
5a
5b
6a
6b
I_r
I_m
8a
9a
11a
12a
13
10
I_x
Low-pass filter
Offset adjustment means
Amplitude adjustment means
Phase adjustment means
$I_{x'}$
15
7
90°phase-shifter
8b
9b
Digital-to-analogue converter
Phase angle calculating electronics
Low-pass filter
I_y
11b
12b
Offset adjustment means
Amplitude adjustment means
$I_{y'}$
Analogue-to-digital converter
14
200
300
Microprocessor
17

FIG. 6

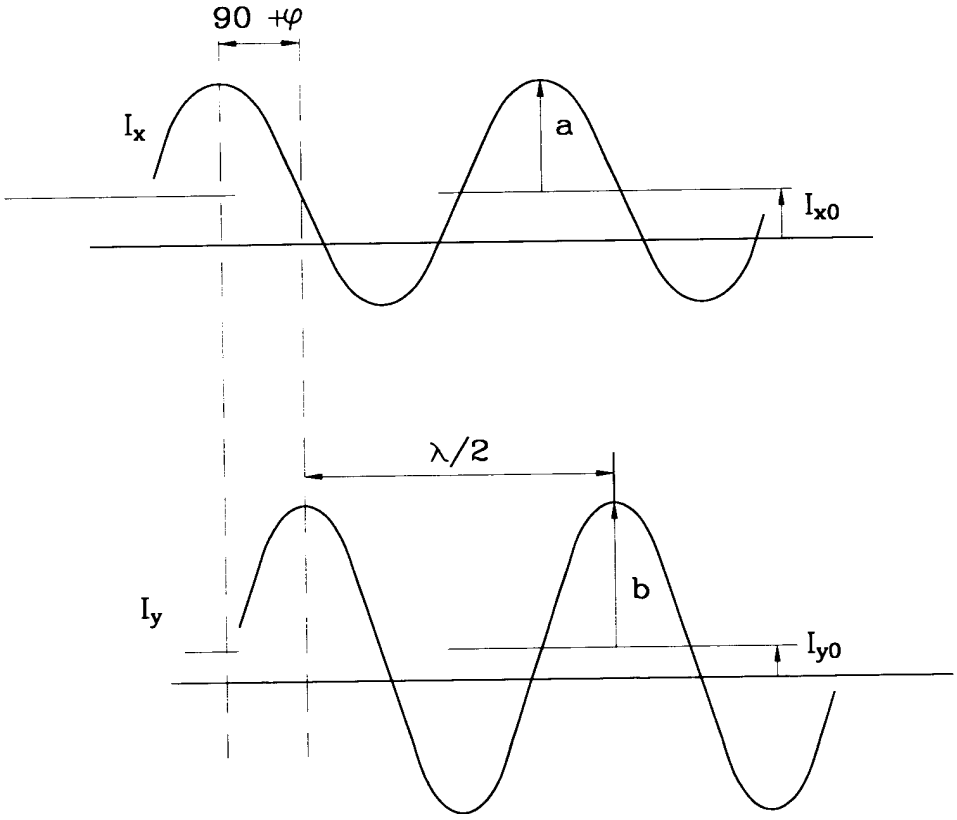


FIG. 7

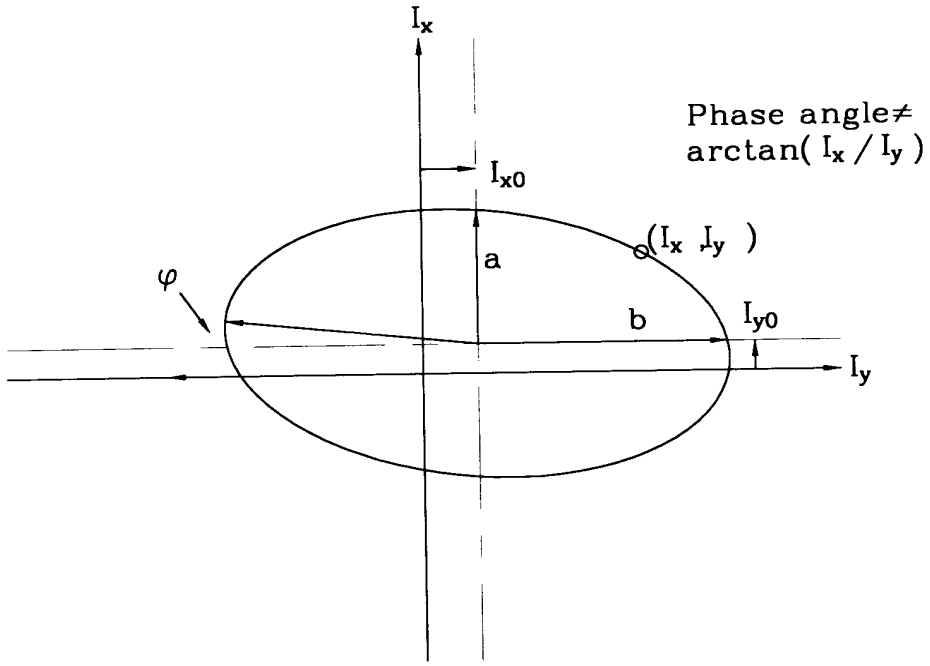


FIG. 8

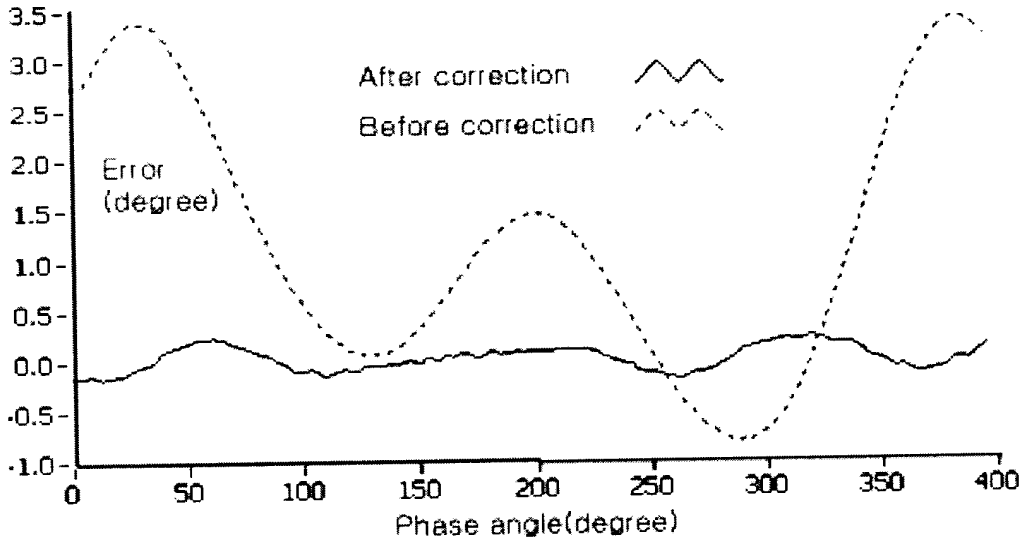

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
Error
(degree)
After correction
Before correction
0
50
100
150
200
250
300
350
400
Phase angle(degree)

FIG. 9

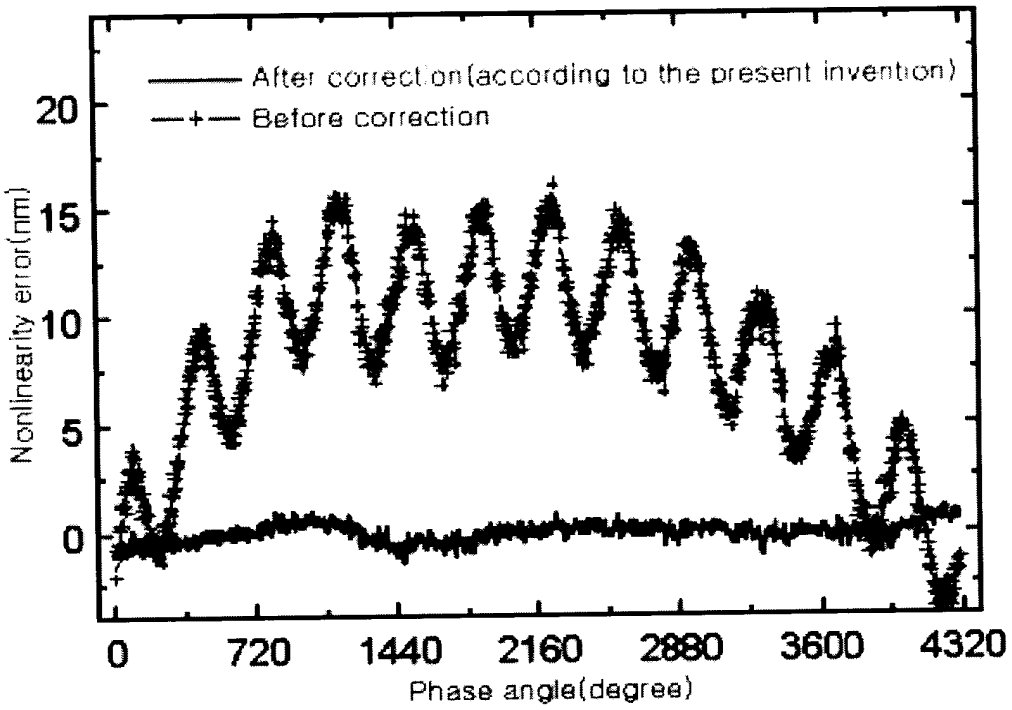

After correction(according to the present invention)
Before correction
Nonlinearity error(nm)
20
15
10
5
0
0
720
1440
2160
2880
3600
4320
Phase angle(degree)

FIG.1

1: Laser

7: 90° phase shifter

9a:Low-pass filter

9b: Low-pass filter

400: Phase angle calculating electronics

FIG.2

FIG.3

Phase angle = $\arctan(I_x/I_y)$

FIG.4

1: Laser

7: 90° phase shifter

16: Lookup table

9a: Low-pass filter

9b: Low-pass filter

400: Phase angle calculating electronics

FIG.5

Laser

7: 90° phase shifter

9a: Low-pass filter

9b: Low-pass filter

10: Phase angle calculating electronics

11a: Offset adjustment means

11b: Offset adjustment means

12a: Amplitude adjustment means

12b: Amplitude adjustment means

13: Phase adjustment means

14: Analogue-to-digital converter

15: Digital-to-analogue converter

17: Microprocessor

FIG.6

FIG.7

Phase angle ≠ arctan(I_x/I_y)

FIG.8

Error(degree)

Phase angle(degree)

After correction

Before correction

FIG.9

Nonlinearity error

Phase angle(degree)

After correction(according to the present invention)

Before correction